Status and seasonal patterns of adult Rhopalocera (Lepidoptera) in north-eastern Algeria

Boudjéma Samraoui

Dr. Boudjéma Samraoui, University of Annaba, 4 rue Hassi-Beïda, Annaba, Algeria

Abstract: Preliminary to a systematic survey of the butterflies of Algeria, data on the status, distribution and phenology of adult Rhopalocera of N.E. Algeria, has been accumulated over a six-year period.

Statut et phénologie des Rhopalocères (Lepidoptera) adultes dans la nord-est algérien

Résume: En prélude à un inventaire systématique des Lépidoptères algériens, des données sur le statut, la distribution et la phénologie des Rhopalocères adultes du N.E. algérien ont été accumulées sur une période de six années.

Status und jahreszeitliches Flugverhalten von Tagfaltern (Lepidoptera: Rhopalocera) im nordöstlichen Algerien

Zusammenfassung: Im Vorfeld einer systematischen Erhebung zur Schmetterlingsfauna Algeriens werden Daten zum Status, zur Verbreitung und zum jahreszeitlichen Flugverhalten imaginaler Rhopaloceren aus Nordostalgerien publiziert, die über sechs Jahren zusammengetragen wurden.

Introduction

The butterfly fauna of Algeria has held the interest of scientists and naturalists for over two centuries and the country has provided a fair number of type-localities (Higgins & Riley 1970). However, past studies suffer mainly from being too limited in time and although very valuable on taxonomical and biogeographical grounds, have left us with almost no significant knowledge of the ecology of local species. Thus, the status, seasonal pattern and larval food-plants of Algerian butterflies are rather poorly known. In this paper, data on the status and seasonal pattern of adult Rhopalocera of NE Algeria are provided and knowledge on their habitats and larval food-plants is summarised. The study of Sériziat (1884) is particularly commented upon and it is used as a reference, being the only sustained work in an area very close to our own (less than 80 km) and whose climate and vegetation is similar to that found in the study area.

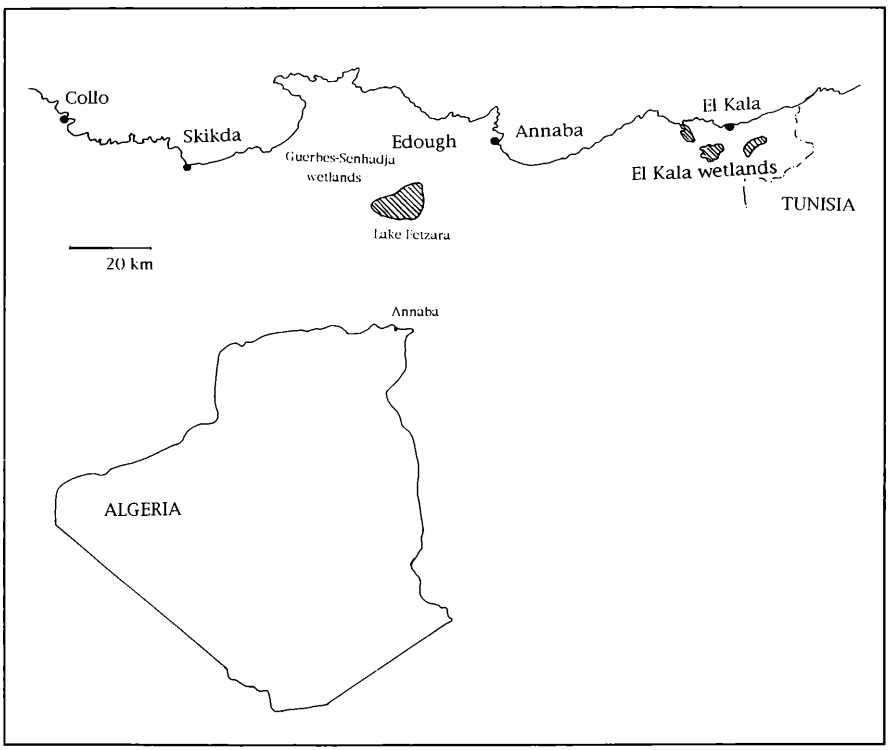

Fig. 1: Location of sampled areas.

Study sites

The area we sampled ranges from the Guerbes/Senhadja wetlands complex (SAMRAOUI & DE BÉLAIR 1997) to the El Kala National Park (STEVENSON et al. 1988) and includes the Edough mountain, Lake Fetzara and the marshes east of Annaba (Fig. 1). The climate is subhumid to humid and typically consists of two seasons: a hot and dry period (June to September) and a wet season (with irregular rainfall) characterised by a warm winter.

Methods

Collecting was carried out in a great variety of habitats during the six year period (1990-1995). Unfortunately there exist few winter records at high altitudes. For every recorded species, the following information is provided:

① geographical range,

② habitat and elevation,

③ larval food-plant,

④ status (abundance and distribution),

⑤ observed flying period,

⑥ comment.

Data on habitats and larval food-plants is compiled from HIGGINS (1983) and LARSEN (1974, 1990) and is occasionally supplemented by our observations.

Results

1. *Carcharodus alceae* (ESPER, 1780)

One specimen recorded in Tebessa in July.

2. *Thymelicus hamza* (OBERTHÜR, 1876)

① North African endemic. ② Flowery slopes. ③ Not recorded. ④ Rare. ⑤ May.

3. *Thymelicus sylvestris* (PODA, 1761)

① Palaearctic. ② Woodlands (Cork Oak forests), all altitudes. ③ *Deschampsia, Oryzopsis, Holcus.* ④ Locally moderately abundant in high altitude habitats. ⑤ May-June.

4. *Gegenes nostrodamus* (FABRICIUS, 1793)

① Eremic. ② Hot paths, rocks, dunes. ③ *Aeluropus, Panicum.* ④ Rare and localised. ⑤ May and July. ⑥ Reported as rare with two broods (April and August) by SÉRIZIAT (1884).

5. *Borbo borbonica zelleri* (LEDERER, 1855)

One male caught at El Oued (northern Sahara) in August.

6. *Zerynthia rumina africana* (STICHEL, 1907)

① Western Mediterranean. ② Open heathland. Up to 1500 m. ③ *Aristolochia.* ④ Very rare. ⑤ One capture in the second half of March. ⑥ Described as rather rare and flying in the first half of April by SÉRIZIAT (1884).

7. *Iphiclides podalirius feisthameli* (DUPONCHEL, 1832)

① Palaearctic. ② Open country. Up to 1600 m. ③ *Prunus spinosa, Crataegus, Sorbus, Amygdalus,* fruit trees. ④ Moderately abundant, it is fairly widespread. ⑤ March-August.

8. *Papilio machaon* Linnaeus, 1758

① Holarctic. ② Open country and flowery meadows. Up to 1800 m. ③ *Selinium, Foeniculum, Angelica.* ④ Very rare and restricted to one known colony. ⑤ Observed in April. ⑥ It has not been observed by Sériziat (1884).

9. *Papilio saharae saharae* Oberthür, 1879

① Eremic, ② Dry river beds and gueltas (desert pools). ③ *Pituranthos tortuosus, Ruta, Pycnocycla tomentosa.* ④ Seems fairly common (Ahaggar, Ghardaïa). ⑤ Observed in March, August and October. ⑥ Found outside the study area. This species is generally considered to be a ssp. of *P. machaon.* The reasons for raising it to a species level are given by Larsen (1990).

10. *Anthocharis belia belia* (Linnaeus, 1767)

① Western Mediterranean. ② Open country. Up to 1500 m. ③ *Biscutella lyrata.* ④ Abundant and widespread. ⑤ February to May.

11. *Euchloe crameri* Butler, 1869

① Mediterranean. ② Low altitude. ③ *Iberis.* ④ Not abundant and not widespread. ⑤ February to May.

12. *Euchloe belemia belemia* (Esper, 1800)

① Palaearctic. ② Flowery slopes; low altitude. ③ *Iberis, Sisymbrium.* ④ Not abundant and not widespread. ⑤ February.

13. *Euchloe charlonia charlonia* (Donzel, 1842)

① Eremic. ② Rocky places. Up to 1600 m. ③ *Matthiola tessala, Raphanus?, Diplotaxis.* ④ Unknown. ⑤ March. ⑥ Found outside the study area.

14. *Aporia crataegi* (Linnaeus, 1758)

① Palaearctic. ② Open country. Up to 1800 m. ③ *Vicia tenuifolia, Crataegus, Amygdalus, Prunus?* ④ Not abundant and restricted to high altitude sites. ⑤ June. ⑥ Not observed by Sériziat (1884).

15. *Pieris brassicae brassicae* (Linnaeus, 1758)

① Palaearctic. ② Up to 1800 m. ③ *Tropaeolum, Capparis, Cochlearis, Arabis* and *Crambe.* ④ Not abundant and apparently not widespread. ⑤ Present in winter and spring. ⑥ Large fluctuations may be affecting the populations of this, surprisingly, uncommon species. It has been described as rare by Sériziat (1884).

16. *Pieris rapae* (Linnaeus, 1758)

① Palaearctic. ② Open country. Up to 1800 m. ③ *Brassica, Tropaeolum, Capparis, Medicago sativa.* ④ Most abundant and widespread. ⑤ Present almost all year round.

17. *Pontia daplidice* (LINNAEUS, 1758)

① Palaearctic. ② Open country. Up to 2500 m. ③ *Arabis, Reseda, Sinapis.* ④ Rather uncommon in the region while very abundant in the Sahara. ⑤ Observed in March and August.

18. *Colias crocea* (FOURCROY, 1785)

① Western Palaearctic. ② Open country. Up to 2000 m. ③ *Medicago sativa, Tephrosia, Astragalus* and *Colutea.* ④ Abundant and widespread. ⑤ April to December. ⑥ Contrary to SÉRIZIAT's observations, the form *helice* is present.

19. *Gonepteryx rhamni meridionalis* RÖBER, 1907

① Palaearctic. ② Up to 1600 m. ③ *Rhamnus.* ④ Abundant but less widespread than following species. ⑤ All year round. ⑥ This species seems to migrate up to high altitude aestivating sites (undergoing probably a delayed ovarian development) before migrating down in the autumn.

20. *Gonepteryx cleopatra cleopatra* (LINNAEUS, 1767)

① Mediterranean. ② Up to 1700 m. ③ *Rhamnus alaternus.* ④ Abundant and widespread. ⑤ All year round. ⑥ It is not clear whether adults aestivate like those of *G. rhamni.*

21. *Lycaena phlaeas phlaeas* (LINNAEUS, 1761)

① Holarctic. ② Up to 2000 m. ③ *Rumex, Polygonum.* ④ Very abundant and widespread. ⑤ From March to November.

22. *Tomares ballus* (FABRICIUS, 1787)

① Palaearctic. ② Up to 1600 m. ③ *Lotus?* ④ Rare and localised. ⑤ March. ⑥ Reported as abundant from March 20 to April 20 by SÉRIZIAT (1884).

23. *Tomares mauretanicus* (LUCAS, 1849)

① North African endemic. ② Up to 1500 m. ③ *Hedysarum pallidum, Hippocrepis multisiliquosus.* ④ Rare and localised. ⑤ May.

24. *Callophrys rubi* (LINNAEUS, 1758)

① Palaearctic. ② Open country with low scrub. ③ *Vaccinium, Genista, Cytisus, Hedysarum, Ledum palustre.* ④ Rare and localised. ⑤ February. ⑥ Reported as excessively rare by SÉRIZIAT (1884).

25. *Satyrium esculi mauretanica* (STAUDINGER, 1892)

① Western Mediterranean. ② Up to 1200 m. ③ Dwarf oaks. ④ Uncommon and restricted to high altitude. ⑤ June and July. ⑥ Reported as very abundant by SÉRIZIAT (1884).

26. *Lampides boeticus* (LINNAEUS, 1767)

① Palaeotropical. ② Open country; all altitudes. ③ *Colutea, Lupinus angustifolia.* ④ Rare and localised (found also in the Tassili N'Ajjer). ⑤ July.

27. *Leptotes pirithous* (LINNAEUS, 1767)

① Afrotropical. ② Open country; all altitudes. ③ *Genista, Plumbago.* ④ Rare and localised. ⑤ End of summer.

28. *Celastrina argiolus* (LINNAEUS, 1758)

① Holarctic. ② Light woodlands; all altitudes. ③ *Rhamnus, Evonymus, Genista, Spartium, Astragalus, Rubus, Erica, Calluna, Syringa, Cornus.* ④ Abundant and widespread. ⑤ February to August. ⑥ Reported as very abundant by SÉRIZIAT (1884).

29. *Aricia cramera* (ESCHSCHOLTZ, 1821)

① Palaearctic. ② Low altitudes; not over 1200 m. ③ *Lotus, Medicago, Fragaria, Ononis.* ④ Very abundant and widespread. ⑤ March to October.

30. *Polyommatus icarus* (ROTTEMBURG, 1775)

① Palaearctic. ② Open country, meadows. ③ *Lotus, Medicago, Fragaria, Ononis.* ④ Very abundant and widespread. ⑤ March to October.

31. *Vanessa atalanta* (LINNAEUS, 1758)

① Holarctic. ② Open country, light woodlands. ③ *Urtica, Carduus, Parietaria.* ④ Fairly abundant and widespread. ⑤ Present almost all year round. ⑥ This species is strongly suspected of undergoing a migration to high altitude sites to aestivate as adult before moving down in the autumn. It is reported as rare or occasional by HIGGINS (1983) and rare by SÉRIZIAT (1884).

32. *Vanessa cardui* (LINNAEUS, 1758)

① Holarctic. ② Open country; light woodlands. ③ *Carduus, Urtica, Malva, Arctium.* ④ Very abundant and widespread (including Central Sahara). ⑤ Present all year round. ⑥ Another species that probably undergoes a migration to surrounding hills to aestivate as adult before returning lowland in the autumn. Record numbers (> 1000 specimens) have been observed at the end of spring 1990 and in October 1992.

33. *Polygonia c-album* (LINNAEUS, 1758)

① Palaearctic. ② Open country; light woodland; up to 1800 m. ③ *Urtica, Salix, Humulus.* ④ Very rare and restricted to high altitude. ⑤ Recorded in June. ⑥ Reported as very rare by SÉRIZIAT (1884), its status does not seem to have changed much.

34. *Nymphalis polychloros erythromelas* (AUSTAUT, 1885)

① Palaearctic. ② Woodlands; up to 1800 m. ③ *Ulmus, Salix, Populus, Pyrus, Prunus.* ④ Not abundant and restricted to high altitude. ⑤ March to June.

35. *Melitaea aetherie algerica* RÜHL, 1892

① Western Mediterranean. ② High altitude (1600-2000 m). ③ *Centaurea.* ④ Rare and localised. ⑤ May. ⑥ Not recorded by SÉRIZIAT (1884).

36. *Charaxes jasius jasius* (LINNAEUS, 1767)

① Mediterranean. ② Alder carrs, Cork and Zeen oak forests. ③ *Arbutus unedo*. ④ Not rare and fairly widespread. ⑤ June to November. ⑥ NW-SE movements have been observed in November 1991 & 1992. Alder carrs are the favourite habitats in the region. This species has not been recorded by SÉRIZIAT (1884).

37. *Pararge aegeria aegeria* (LINNAEUS, 1758)

① Palaearctic. ② Light woodland; up to 1200 m. ③ *Agropyron, Triticum repens, Dactylis glomerata, Poa annua*. ④ Very abundant and widespread. ⑤ January-October. ⑥ It is often observed seeking shade in alder carrs and riverine forests.

38. *Lasiommata megera megera* (LINNAEUS, 1767)

① Mediterranean. ② Open country, sea level? ③ *Poa, Dactylis, Festuca*. ④ Very rare and localised. ⑤ May.

39. *Coenonympha pamphilus pamphilus* (LINNAEUS, 1758)

① Palaearctic. ② Grassy places, up to 1800 m. ③ *Poa, Nardus stricta, Cynosurus*. ④ Uncommon and fairly localised. ⑤ May-June. ⑥ Recorded as abundant in summer by SÉRIZIAT (1884).

40. *Coenonympha arcanioides* (PIERRET, 1837)

① North African endemic. ② Up to 1500 m. ③ Not recorded. ④ Moderately abundant and fairly widespread. ⑤ June-July.

41. *Maniola jurtina jurtina* (LINNAEUS, 1758)

① Mediterranean. ② Rough, grassy places; up to 1800 m. ③ *Poa*. ④ Abundant and widespread. ⑤ May to Septembre. ⑥ Females migrate to high altitude sites to aestivate and return lowland at the end of summer. They can be seen wings closed, in shady cork oak forest floors, inconspicuous among dead leaves.

42. *Pyronia cecilia* (VALLANTIN, 1894)

① Mediterranean. ② Rough grounds; up to 2000 m. ③ *Deschampsia*. ④ Not recorded. ⑤ August. ⑥ Found in the western part of Algeria (Tlemcen). Not recorded within the study area.

43. *Pyronia janiroides* (HERRICH-SCHÄFFER, 1851)

① North African endemic. ② Rough ground, usually low altitude. ③ Not recorded. ④ Rare and localised. ⑤ July. ⑥ We have recorded it in a mixed Cork and Zeen oaks forest at an altitude of 1000 m.

44. *Melanargia galathea lucasi* RAMBUR, 1858

① Western Palaearctic. ② Up to 1800 m. ③ *Phleum pratense? Lamarckia aurea?* ④ Rare and localised. ⑤ June. ⑥ Not recorded by SÉRIZIAT (1884).

45. *Hipparchia fidia* (LINNAEUS, 1767)

① Western Mediterranean. ② Among trees; 1000 m or more. ③ *Oryzopsis*. ④ Uncommon and localised. ⑤ August. ⑥ We have recorded it in maquis habitat, down to sea level. SÉRIZIAT (1884) describes it as rare.

46. *Danaus chrysippus* (LINNAEUS, 1758)

① Palaeotropical. ② Oases. ③ *Calotropis procera, Asclepias*. ④ Migrant in the Tell, resident in the Sahara (SAMRAOUI 1996). ⑤ In the desert, it has been recorded from March to October. ⑥ Reviews of records in North Africa are provided by LARSEN (1986) and TENNENT (1995). Breeding colonies of the form *chrysippus* exist in the oases across the Sahara and could well be the source of colonies found in Spain (SAMRAOUI & BENYACOUB 1991, SAMRAOUI et al. 1992, SAMRAOUI 1993). A similar expansion in Southern Europe has also been documented (SCHURIAN et al. 1993).

Discussion

Fourty-one species have been recorded within the limits of the study area. Five more species have been collected elsewhere. Overall, the fourty-six species represent around 42 % of the total Rhopalocera of Algeria.

In the vicinity of Collo, SÉRIZIAT (1884) listed 52 species. We have not been able to clarify the taxonomical status of three listed species (*Anthocharis glauce, A. douei,* and *Syrichtus sao*). Four listed species are erroneous (*Colias hyale, Hipparchia semele, Pyrgus malvae* and *P. carthami*). Finally 13 species were not recorded by ourselves (*Cigaritis siphax, Tarucus theophrastus, Pseudophilotes abencerragus, Glaucopsyche alexis, G. melanops, Argynnis pandora, A. paphia, Melitaea punica, M. didyma, Libythea celtis, Thymelicus acteon, Muschampia proto*). Thirty-two species have also been recorded by us and finally nine species have not been recorded by SÉRIZIAT (*Papilio machaon, Aporia crataegi, Tomares mauretanicus, Leptotes pirithous, Melitae aetherie algerica, Melanargia galathea lucasi, Danaus chrysippus, Thymelicus hamza* and *T. sylvestris*). Although extensive sampling is needed before firm conclusions are reached, there is an apparent decline affecting several species. For, except *D. chrysippus*, a migrant, all the species we recorded and absent in SÉRIZIAT's list are rare and localised and this might explain their apparent absence in Collo, while this is not the case with species we missed as SÉRIZIAT has recorded several of them (*C. siphax, T. theophratus, G. alexis, G. melanops, M. didyma* and *T. acteon*) as common.

We have recorded several species as rare and this status does not seem to have changed for over a century but it is clear that recent degradation of

habitats has been significantly detrimental to many species. The Papilionidae seem particularly vulnerable with two species practically on the brink of extinction, at least locally. Knowledge from other parts of Algeria is lacking but the outlook is unfortunately grim as the region under study is a privileged one hosting a national park and is renown for the diversity of habitats. The life-history of the majority of species is unknown while the larval food-plant of several endemic species has not yet been recorded. This lack of knowledge will necessarily hamper local conservation efforts.

Table 1: Biogeographical data concerning the Rhopalocera of N. E. Algeria.

Origin	N° of species	%
Holarctic	5	12
Palaearctic	18	43
Mediterranean	10	24
N. A. Endemic	4	9.8
Palaeotropical	2	4.8
Afrotropical	1	2.4
Eremic	1	2.4

The majority of the recorded Rhopalocera are of palaearctic origin with few eremic and tropical species (Table 1). This contrasts with findings with aquatic insects, particularly Odonata (Samraoui et al. 1993). The proportion of N. A. endemics relates well with the degree of endemic plant species (G. de Bélair, pers. comm.).

Four species (*G. rhamni, V. atalanta, V. cardui* and *M. jurtina*) seem to aestivate as adults at high altitude (Table 2). In the case of *M. jurtina*, only females undergo this aestivo-migration as males have never been observed in autumn. Some of the following species (*P. aegeria, L. phlaeas, P rapae, P. icarus, C. jasius, P. brassicae, C. crocea* and *G. cleopatra*) might also display the same behaviour. A systematic study (rigorous sampling and dissection) is needed to unravel part of the life-history of the above species as distinct populations (resident and migrating) may be involved. Seasonal movement and adult aestivation are often coupled with delayed ovarian development, a likely response to the harsh Mediterranean summer, with the result of postponing ovipositing and larval growth till the autumn (Edwards 1976, Garcia-Barros 1988, Larsen 1986, Scali 1971).

Table 2: Phenology of Rhopalocera in NE Algeria, observations and samples. Counts in two 15-days periods per month. Symbols: ⇩ = observation below 200 m elevation (lowlands); ⇧ = observation above 400 m elevation (higher altitude); ⇳ = observations both below 200 m and above 400 m; ▫ = observations outside the study area. No symbol: the species has not been observed within this 15-days period.

List of species/month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Carcharodus alceae							▫					
Thymelicus hamza					⇩							
Thymel. sylvestris					⇧	⇧ ⇧						
Gegenes nostrodamus					⇩		⇩					
Borbo borbonica								▫				
Zerynthia rumina			⇩									
Iphiclid. podalirius			⇩	⇩		⇧ ⇩	⇩	⇩				
Papilio machaon				⇩								
Papilio saharae			▫					▫		▫		
Anthocharis belia		⇩	⇩	⇩ ⇩	⇳							
Euchloe crameri		⇩	⇩		▫							
Euchloe belemia		⇩										
Euchloe charlonia			▫									
Aporia crataegi							⇧					

List of species/month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Pieris brassicae			⇩		⇧	⇧						
Pieris rapae	⇧ ⇩	⇩	⇩ ⇩	⇩ ⇩	⇩ ⇧	⇳ ⇳	⇧	⇩		⇩	⇩ ⇩	⇩ ⇩
Pontia daplidice			▫									
Colias crocea				⇩ ⇩	⇩ ⇧	⇳ ⇳				⇩		⇩ ⇩
Gonepteryx rhamni	⇩	⇧ ⇩	⇩	⇩ ⇩	⇧ ⇳	⇧ ⇧	⇧ ⇧			⇩ ⇩		⇩
Gonept. cleopatra		⇩ ⇩	⇩	⇩ ⇩	⇳	⇳ ⇩	⇩ ⇧				⇩	
Lycaena phlaeas			⇩	⇩ ⇩	⇩	⇳ ⇳	⇧ ⇩		⇩	⇩	⇩	
Tomares ballus			⇩									
Tom. mauretanicus					⇩							
Callophrys rubi		⇩										
Satyrium esculi						⇧ ⇧	⇧					
Lampides boeticus							⇩					
Leptotes pirithous									⇩			
Celastrina argiolus		⇩	⇩	⇩ ⇩	⇩	⇩	⇧	⇩				
Aricia cramera							⇩ ⇧			⇩	⇩	
Polyomm. icarus			⇩		⇳ ⇧	⇳ ⇧	⇩ ⇳		⇩	⇩		

List of species/month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Vanessa atalanta	⇩			⇩ ⇩	⇩ ⇧	⇧ ⇧				⇩	⇩ ⇩	⇩
Vanessa cardui	⇩	⇩	⇩	⇩ ⇩	⇧ ⇧	⇳ ⇳	⇧		⇩	⇩ ⇩		⇩
Polygonia c-album						⇧						
Nymph. polychloros			⇧	⇧	⇧	⇧						
Melitaea aetherie					⇩							
Charaxes jasius						⇧ ⇳	⇧		⇩	⇩ ⇩	⇩	
Pararge aegeria	⇩ ⇩	⇩	⇳ ⇩	⇩	⇩ ⇳	⇧ ⇳	⇩ ⇳	⇧ ⇩		⇩ ⇩		
Lasiommata megera					▫							
Coenon. pamphilus					▫	⇩						
Coenon. arcanioides						⇧	⇧					
Maniola jurtina					⇧	⇳ ⇧	⇧ ⇧	⇧	⇩ ⇩			
Pyronia cecilia								▫				
Pyronia janiroides							⇧					
Melenargia galathea						⇧ ⇧	⇧					
Hipparchia fidia								⇩				
Danaus chrysippus			▫	▫	⇩	⇩						

Recently, the same phenomenon has been discovered in other insects (SAMRAOUI et al. in press, SAMRAOUI & CORBET in prep).

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